Fig. 1

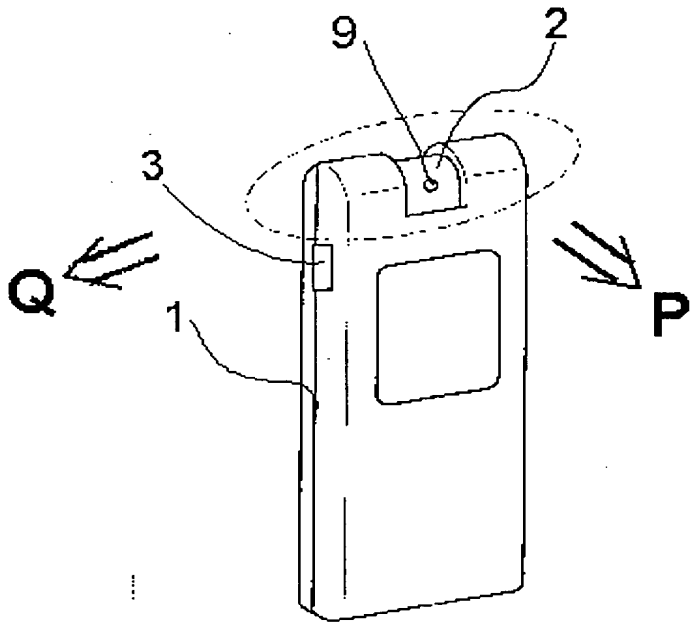


Fig. 2a

PRIOR ART

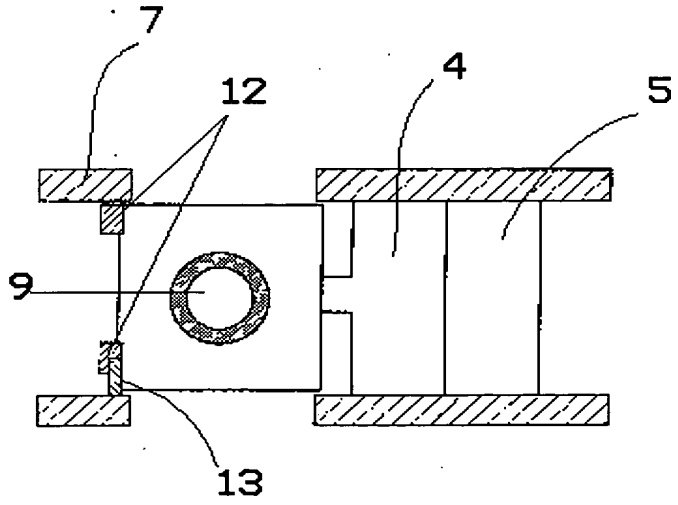


Fig.2b

PRIOR ART

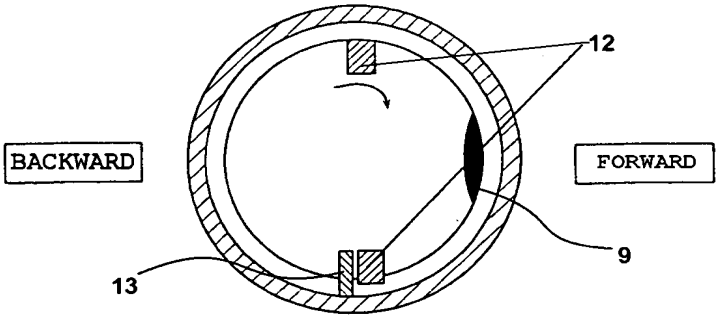


Fig.2c

PRIOR ART

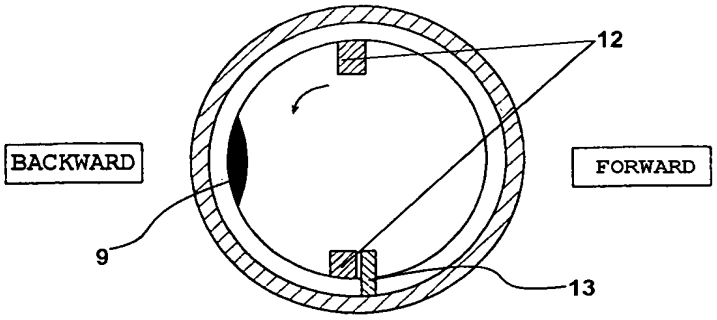


Fig.3a

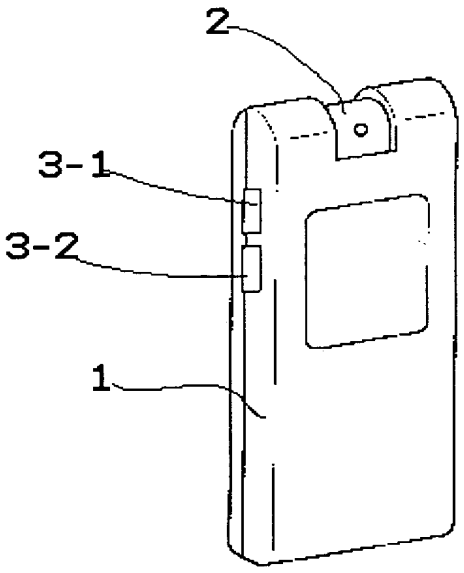


Fig.3b

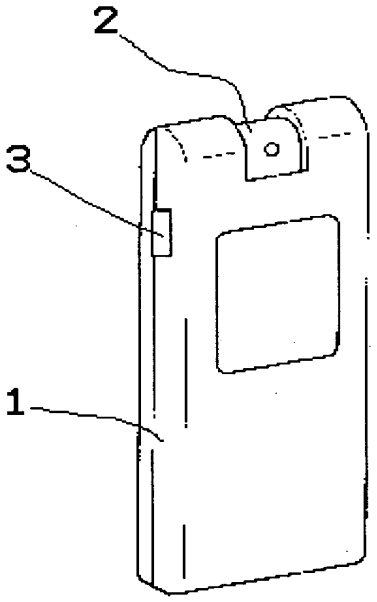


Fig.4a

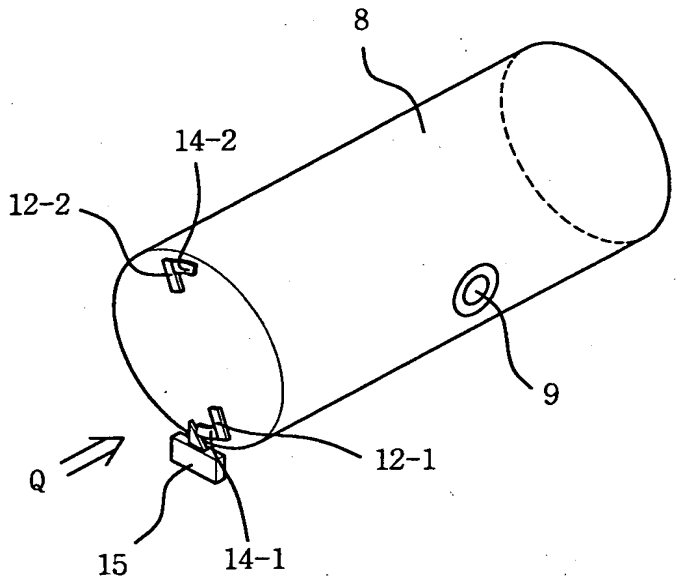


Fig.4b

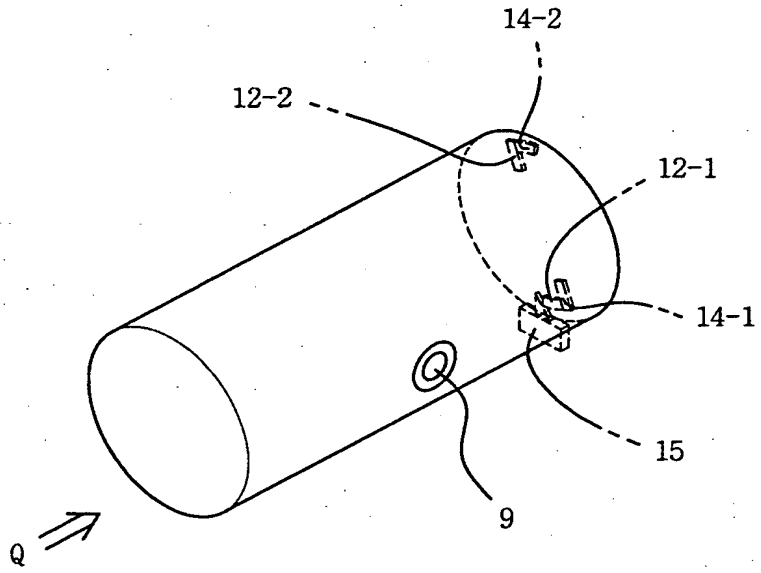


Fig. 5a

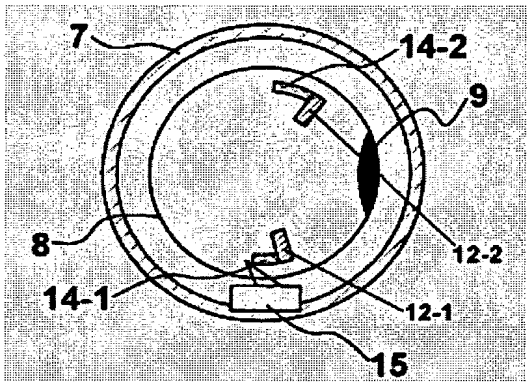


Fig. 5b

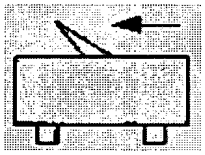


Fig.5c

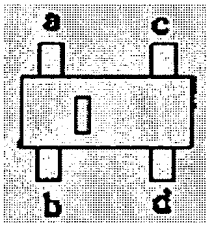


Fig.5d

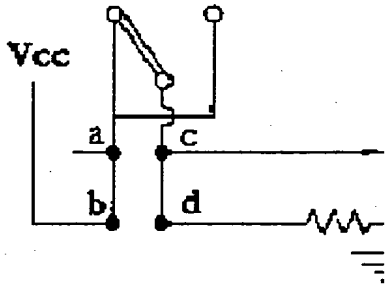


Fig.5e

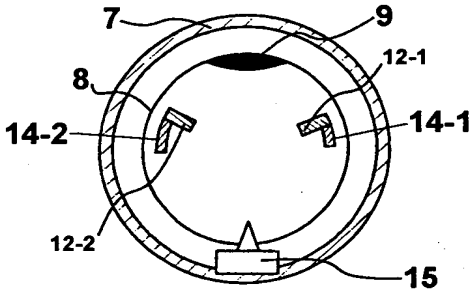


Fig.5f

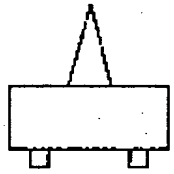


Fig.5g

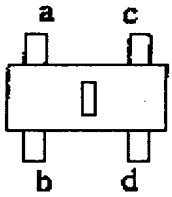


Fig.5h

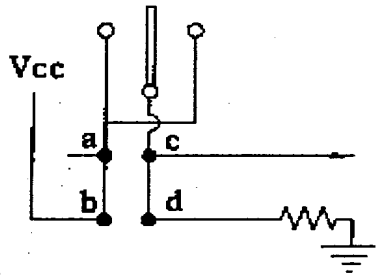


Fig.5i

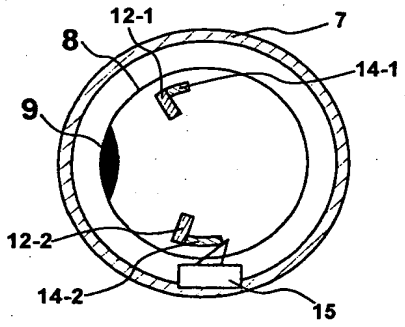


Fig.5j

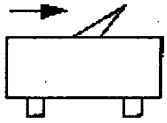


Fig.5k

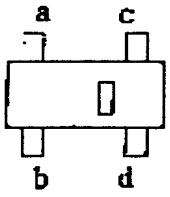


Fig.5l

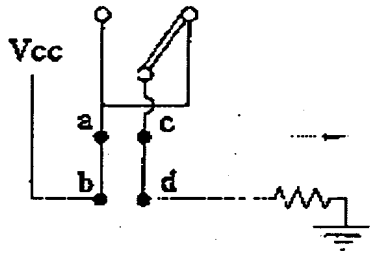


Fig.6a

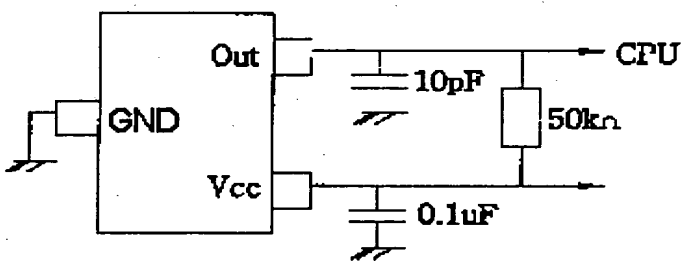


Fig.6b

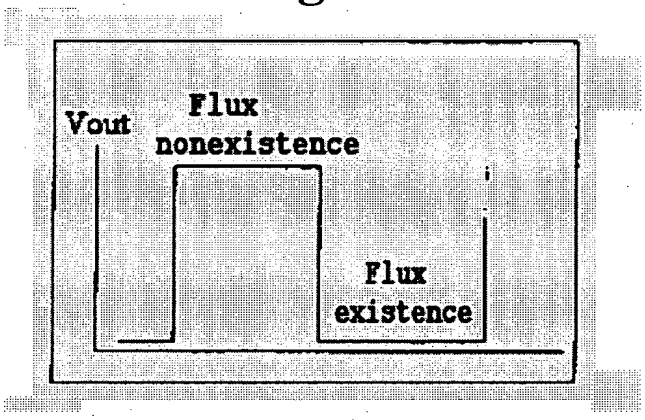

Vout
Flux
nonexistence
Flux
existence

Fig.7a

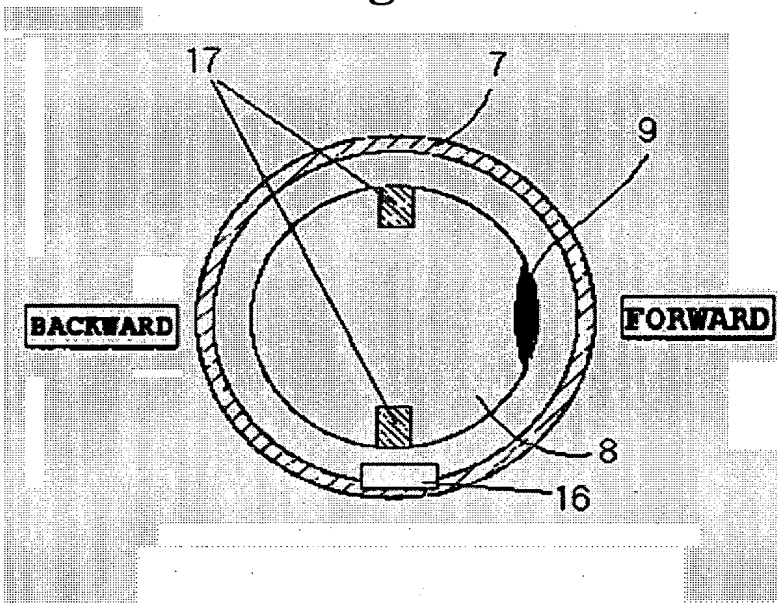

17
7
9
BACKWARD
FORWARD
8
16

Fig.7b

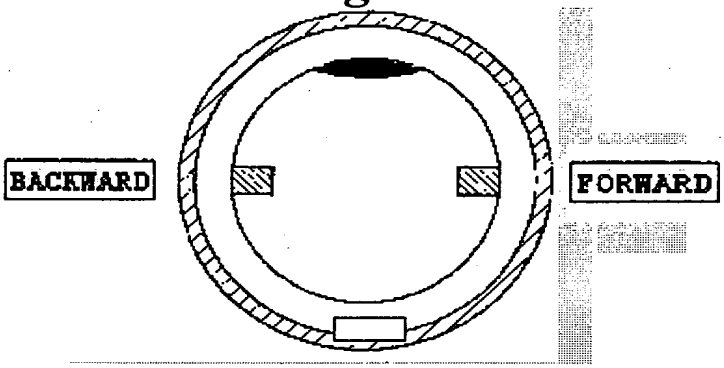


Fig.7c

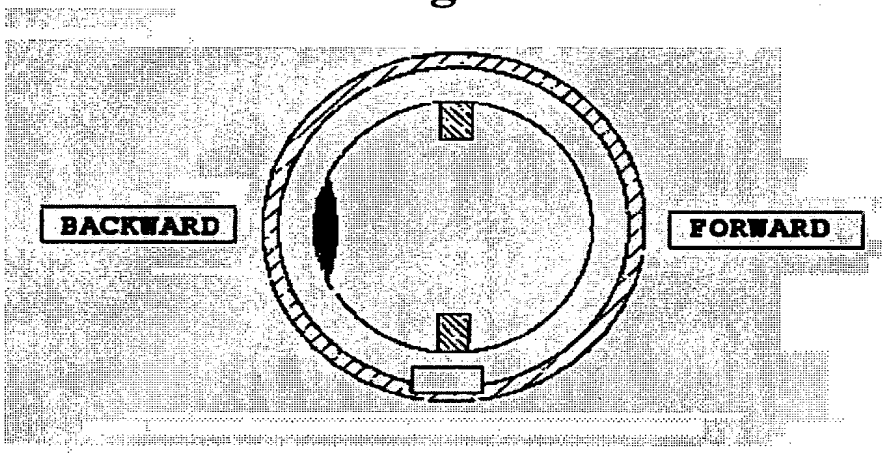


Fig.8a

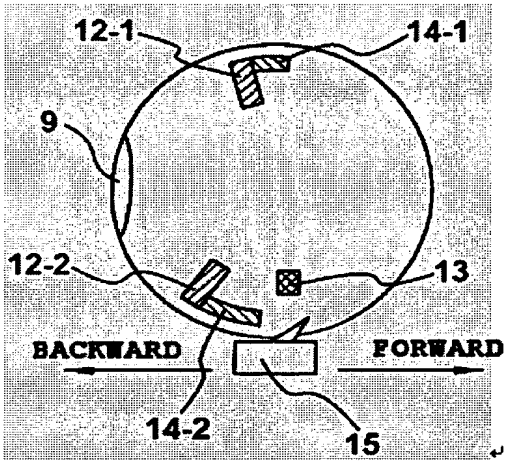


Fig.8b

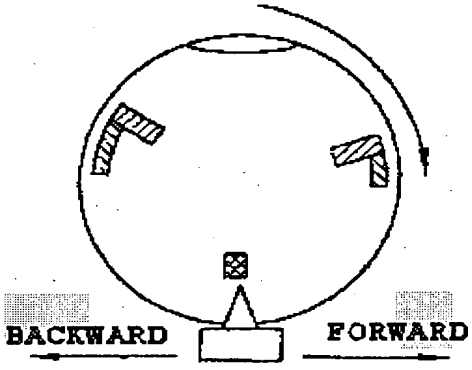


Fig.8c

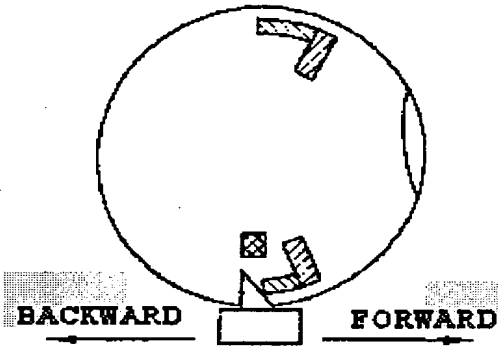


Fig.9

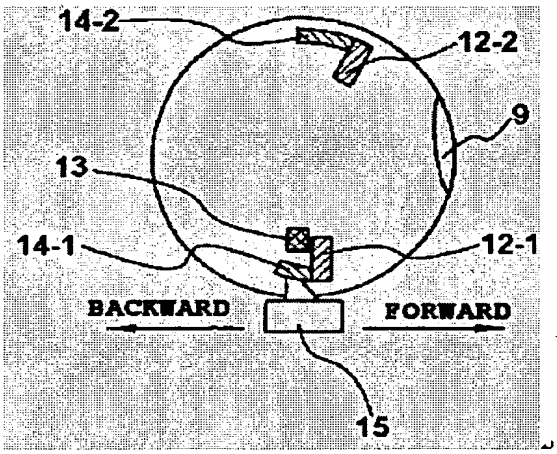


Fig.10a

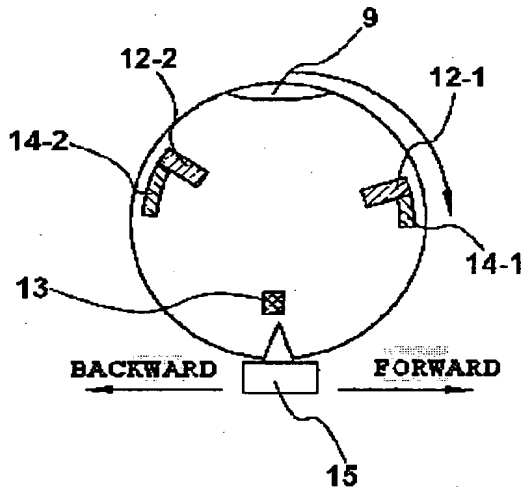


Fig.10b

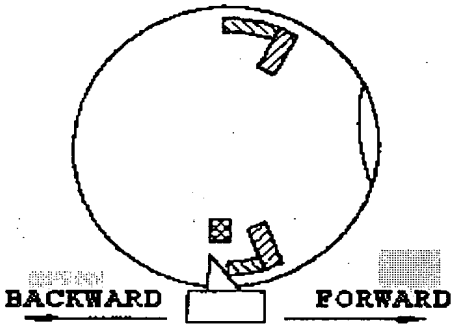


Fig.11a

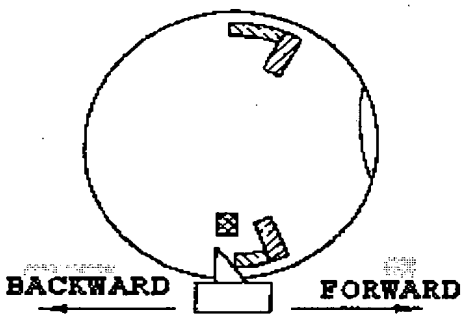


Fig.11b

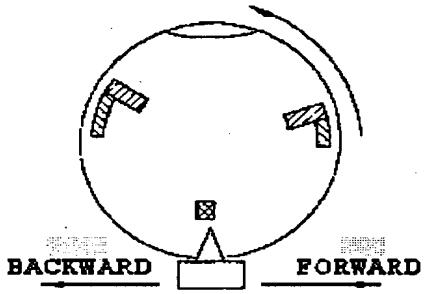


Fig.11c

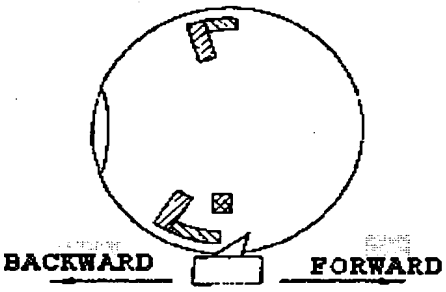


Fig.12a

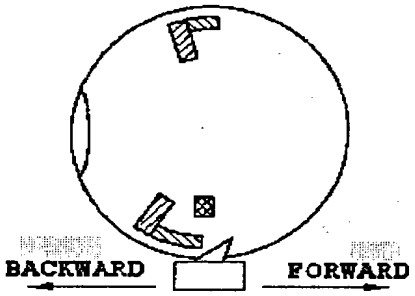


Fig.12b

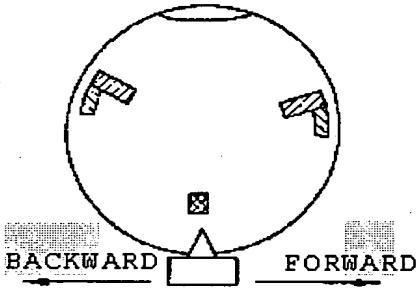


Fig.12c

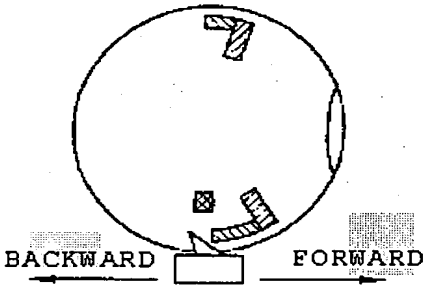


Fig.13a

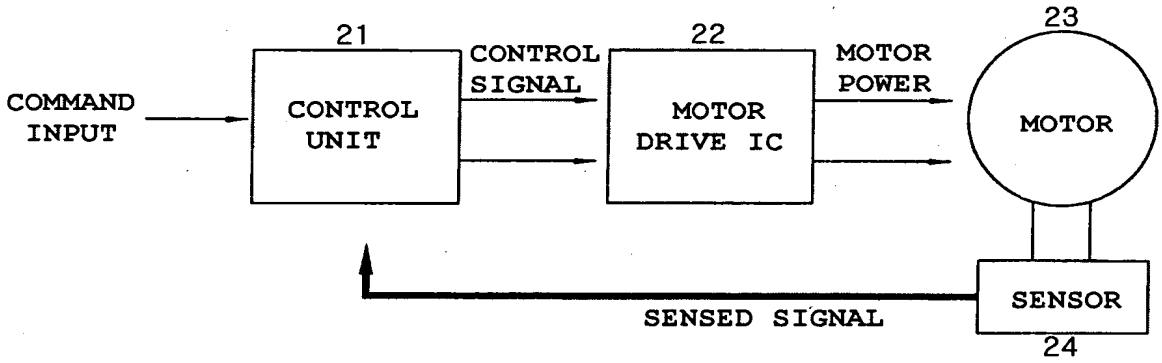

21
CONTROL SIGNAL
22
MOTOR POWER
23
COMMAND INPUT
CONTROL UNIT
MOTOR DRIVE IC
MOTOR
SENSOR
24
SENSED SIGNAL

Fig.13b

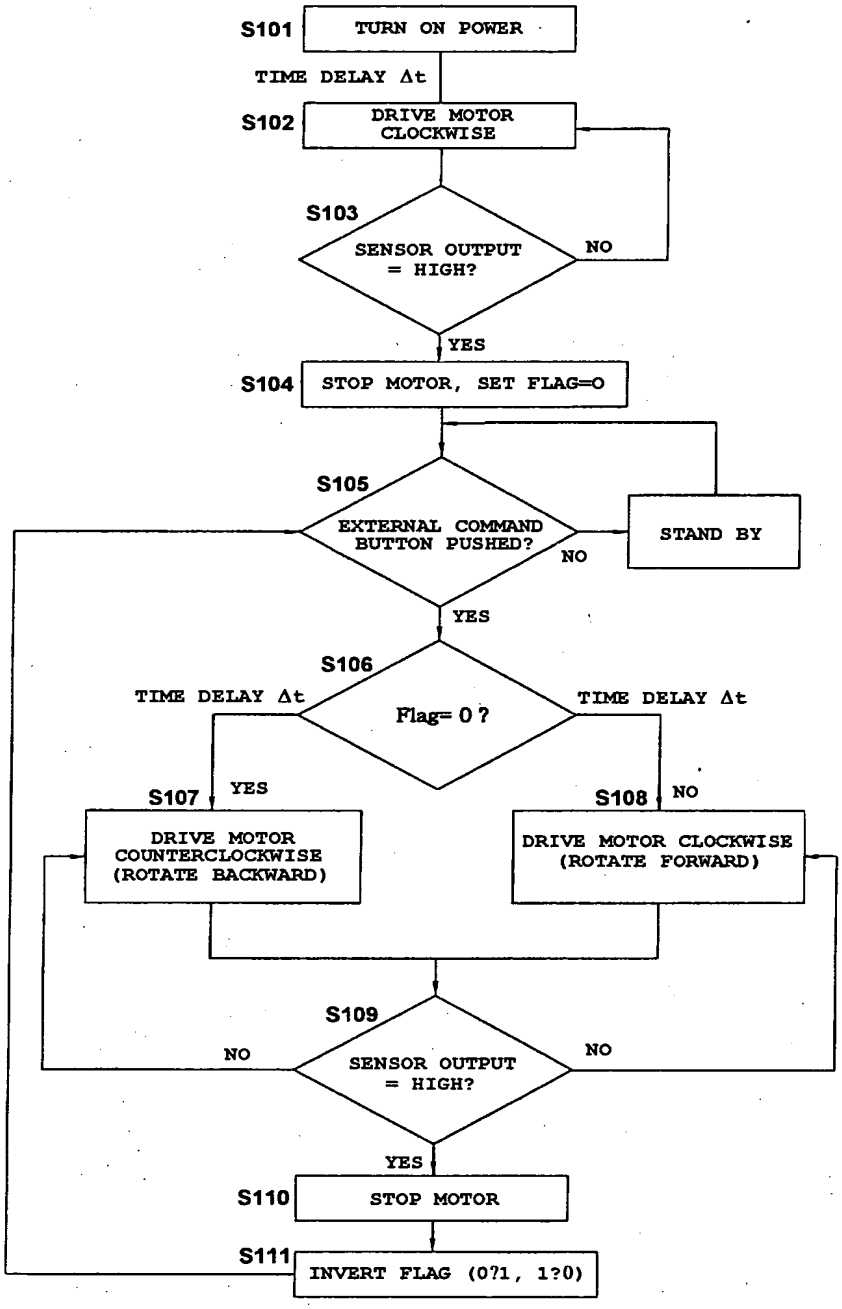

S101
TURN ON POWER
TIME DELAY Δt
S102
DRIVE MOTOR CLOCKWISE
S103
SENSOR OUTPUT = HIGH?
NO
YES
S104
STOP MOTOR, SET FLAG=O
S105
EXTERNAL COMMAND BUTTON PUSHED?
NO
STAND BY
YES
S106
TIME DELAY Δt
Flag= 0 ?
TIME DELAY Δt
S107
YES
DRIVE MOTOR COUNTERCLOCKWISE (ROTATE BACKWARD)
S108
NO
DRIVE MOTOR CLOCKWISE (ROTATE FORWARD)
S109
NO
SENSOR OUTPUT = HIGH?
NO
YES
S110
STOP MOTOR
S111
INVERT FLAG (0?1, 1?0)

Fig.14a

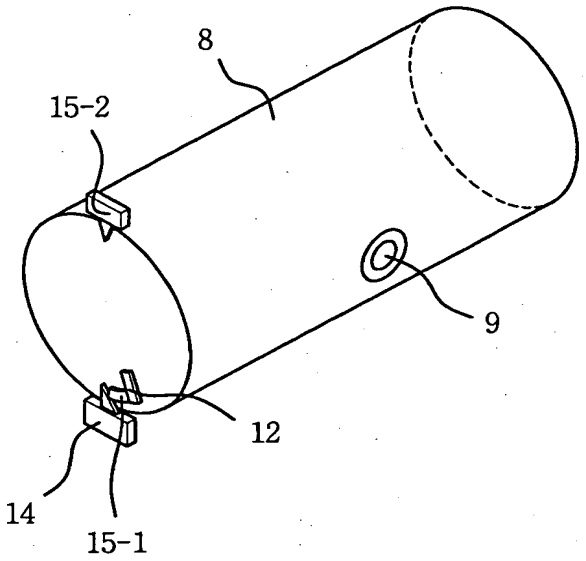


Fig.14b

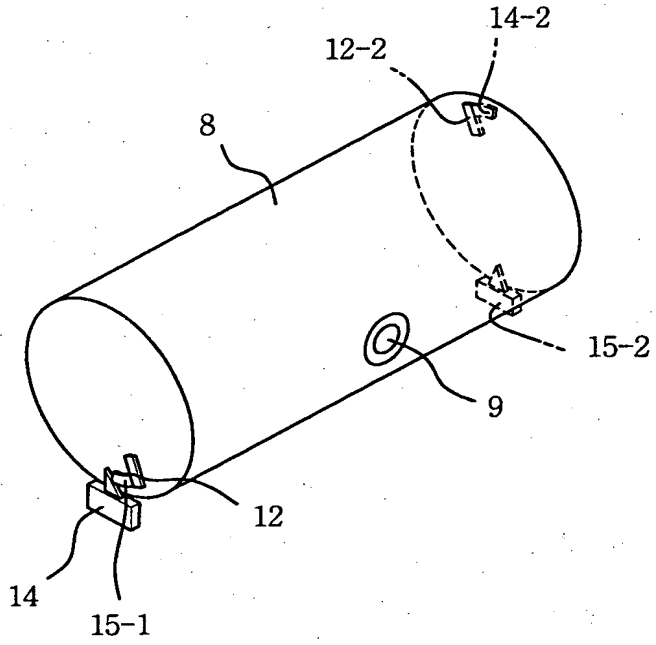


Fig.15a

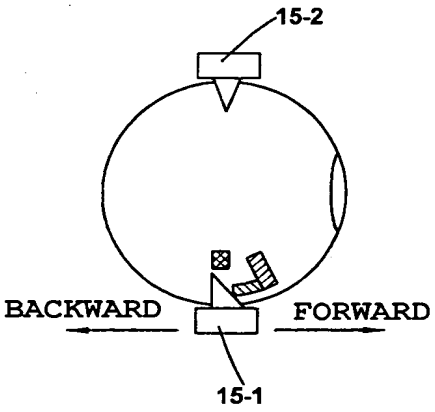


Fig.15b

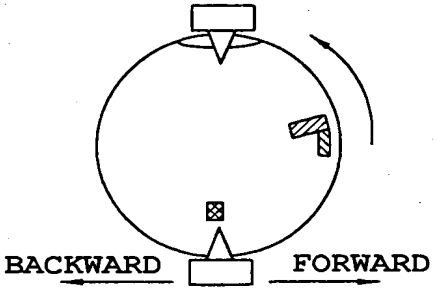


Fig.15c

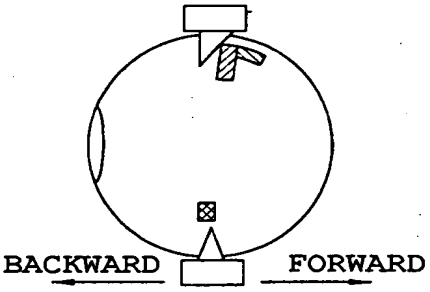


Fig.16a

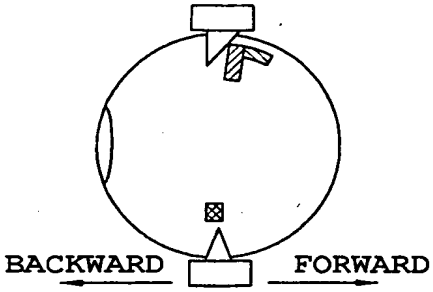


Fig.16b

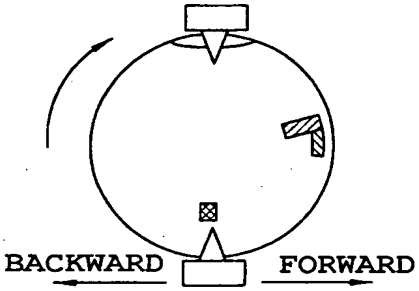


Fig.16c

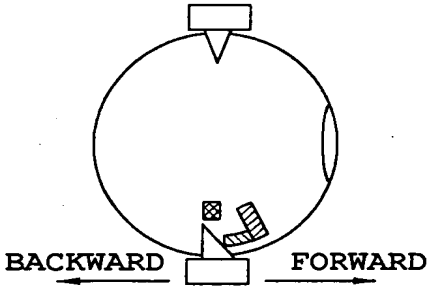


Fig.17a

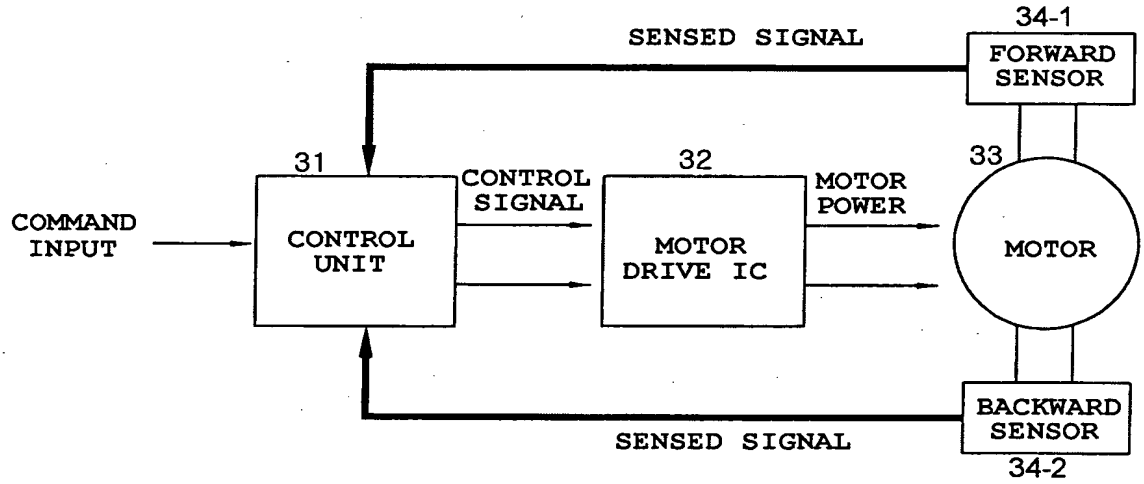

34-1
SENSED SIGNAL
FORWARD SENSOR
31
CONTROL SIGNAL
32
MOTOR POWER
33
COMMAND INPUT
CONTROL UNIT
MOTOR DRIVE IC
MOTOR
BACKWARD SENSOR
SENSED SIGNAL
34-2

Fig.17b

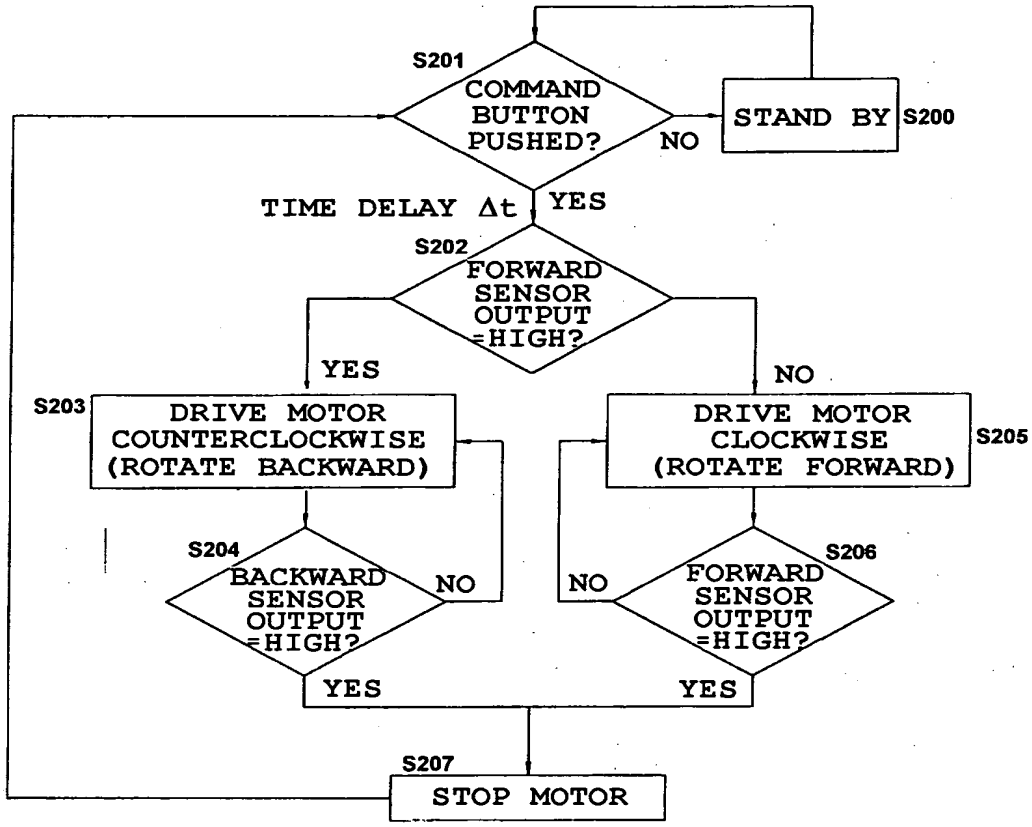

S201
COMMAND BUTTON PUSHED?
NO
STAND BY
S200
TIME DELAY Δt
YES
S202
FORWARD SENSOR OUTPUT =HIGH?
YES
NO
S203
DRIVE MOTOR COUNTERCLOCKWISE (ROTATE BACKWARD)
DRIVE MOTOR CLOCKWISE (ROTATE FORWARD)
S205
S204
BACKWARD SENSOR OUTPUT =HIGH?
NO
NO
S206
FORWARD SENSOR OUTPUT =HIGH?
YES
YES
S207
STOP MOTOR

Fig.18a

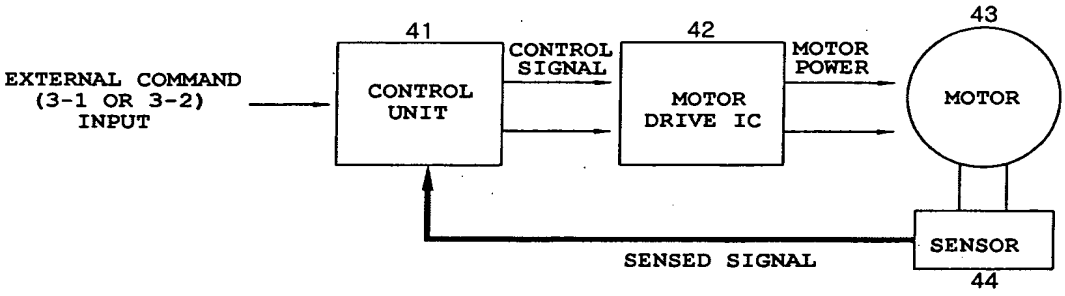

EXTERNAL COMMAND
(3-1 OR 3-2)
INPUT
41
CONTROL
UNIT
CONTROL
SIGNAL
42
MOTOR
DRIVE IC
MOTOR
POWER
43
MOTOR
SENSOR
44
SENSED SIGNAL

Fig.18b

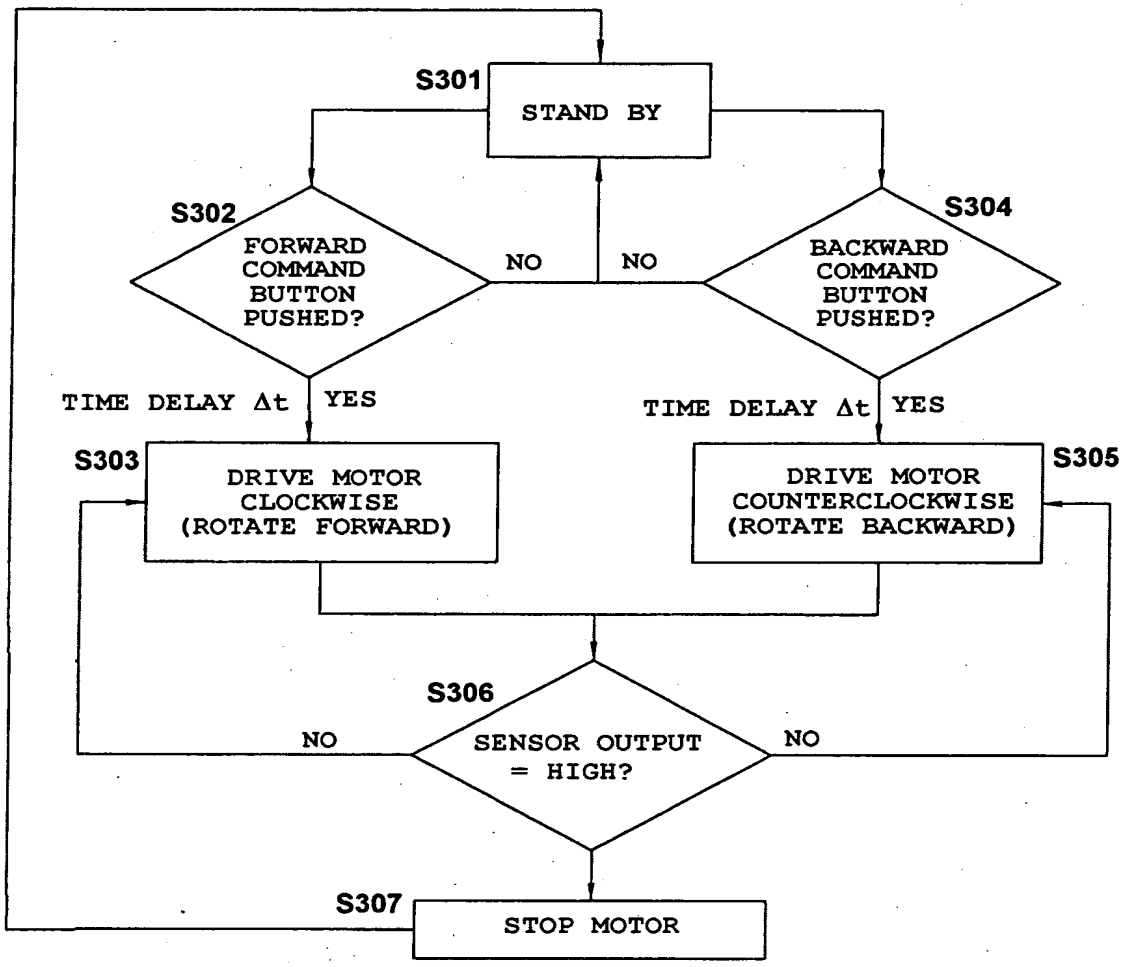

S301
STAND BY
S302
FORWARD COMMAND BUTTON PUSHED?
NO
NO
S304
BACKWARD COMMAND BUTTON PUSHED?
TIME DELAY Δt
YES
TIME DELAY Δt
YES
S303
DRIVE MOTOR CLOCKWISE (ROTATE FORWARD)
S305
DRIVE MOTOR COUNTERCLOCKWISE (ROTATE BACKWARD)
S306
NO
SENSOR OUTPUT = HIGH?
NO
S307
STOP MOTOR

Fig.19a

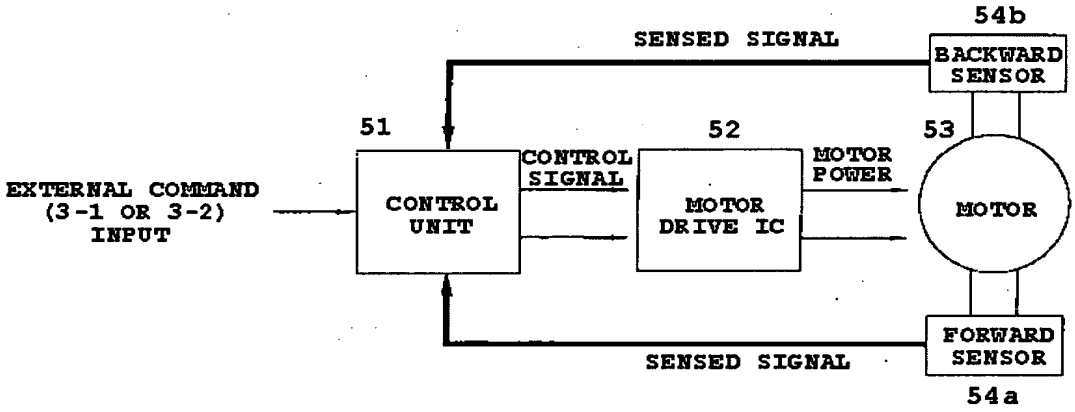

54b
SENSED SIGNAL
BACKWARD SENSOR
51
52
53
CONTROL SIGNAL
MOTOR POWER
EXTERNAL COMMAND (3-1 OR 3-2) INPUT
CONTROL UNIT
MOTOR DRIVE IC
MOTOR
FORWARD SENSOR
SENSED SIGNAL
54a

Fig.19b

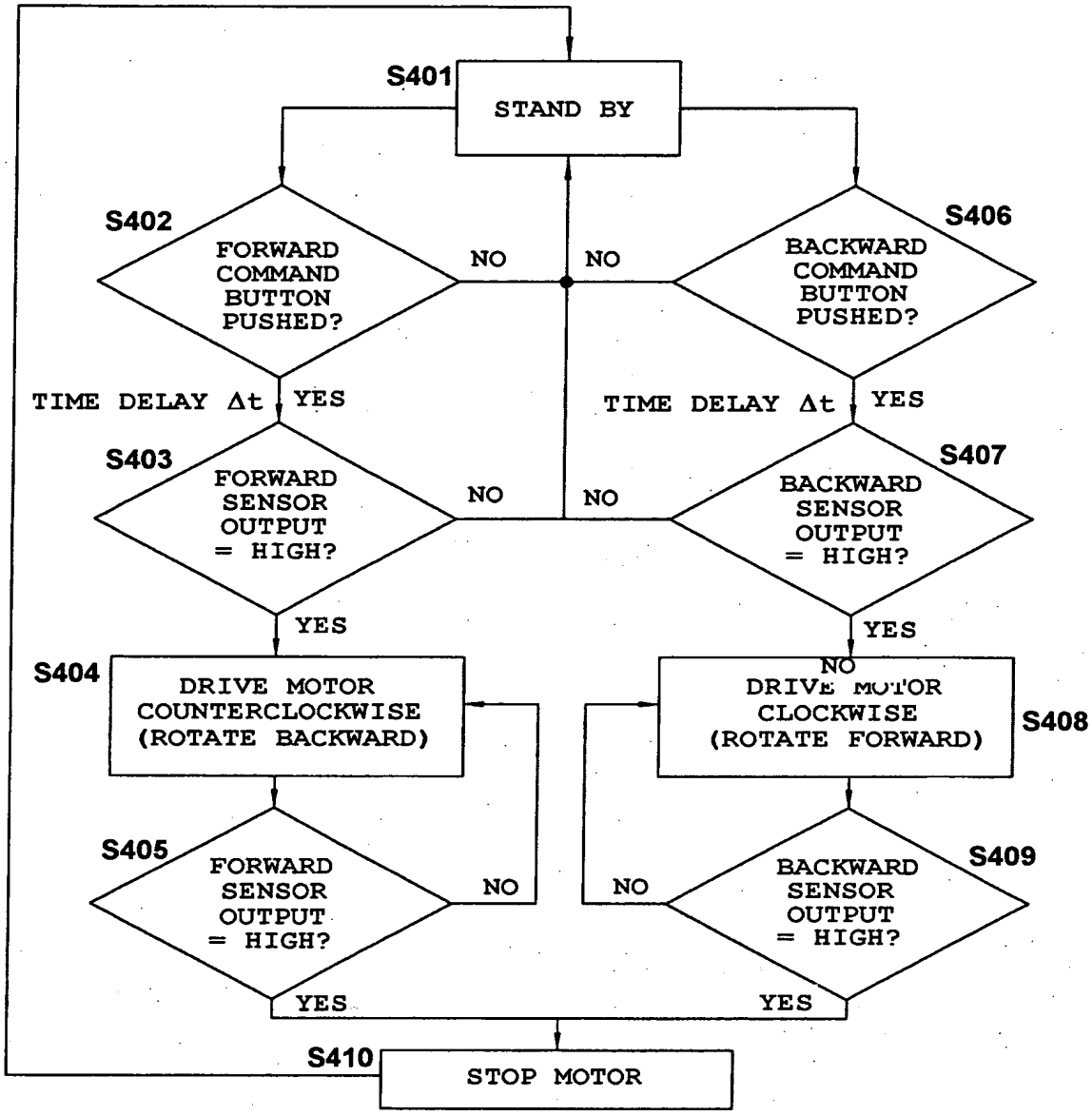

S401
STAND BY
S402
FORWARD COMMAND BUTTON PUSHED?
NO
NO
S406
BACKWARD COMMAND BUTTON PUSHED?
TIME DELAY Δt
YES
TIME DELAY Δt
YES
S403
FORWARD SENSOR OUTPUT = HIGH?
NO
NO
S407
BACKWARD SENSOR OUTPUT = HIGH?
YES
YES
S404
DRIVE MOTOR COUNTERCLOCKWISE (ROTATE BACKWARD)
NO
DRIVE MOTOR CLOCKWISE (ROTATE FORWARD)
S408
S405
FORWARD SENSOR OUTPUT = HIGH?
NO
NO
S409
BACKWARD SENSOR OUTPUT = HIGH?
YES
YES
S410
STOP MOTOR

Fig.20

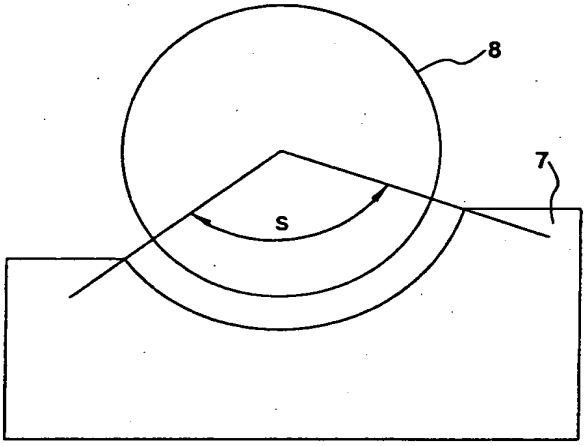


Fig.21

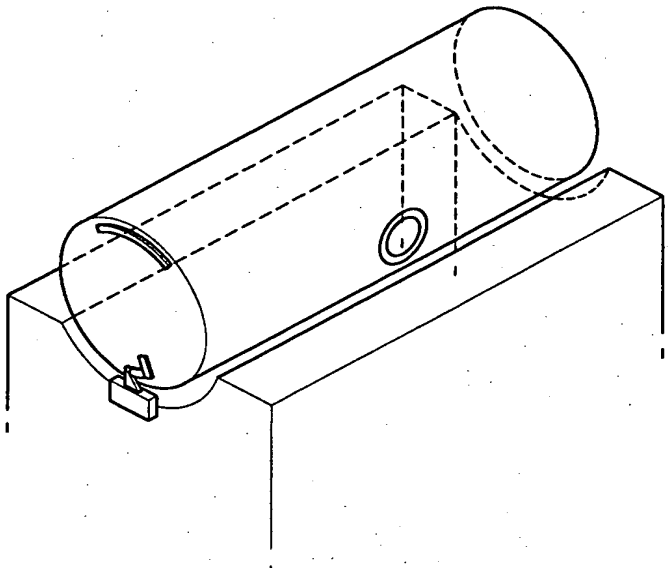


Fig.22a

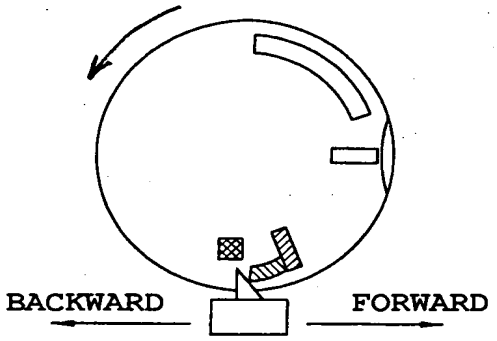


Fig.22b

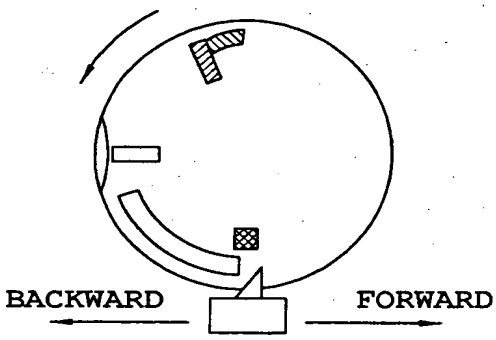


Fig.22c

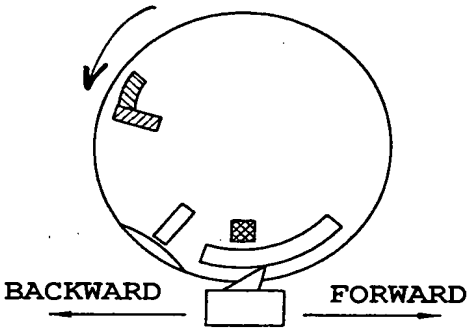


Fig.22d

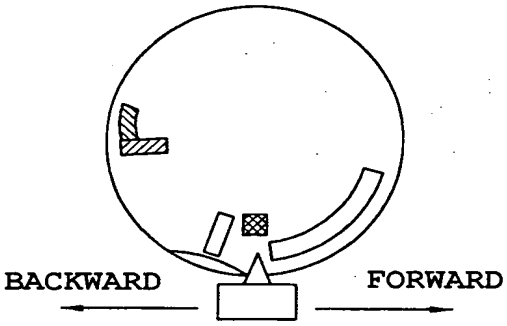


Fig.23a

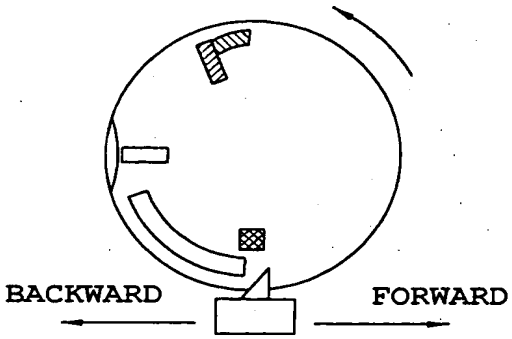


Fig.23b

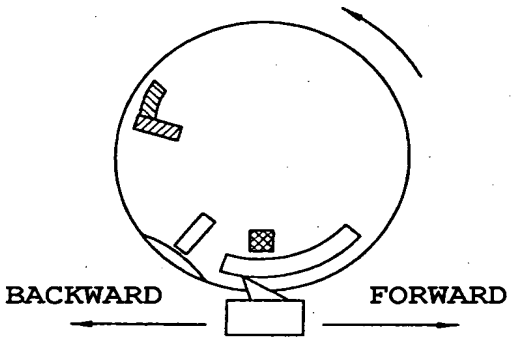


Fig.23c

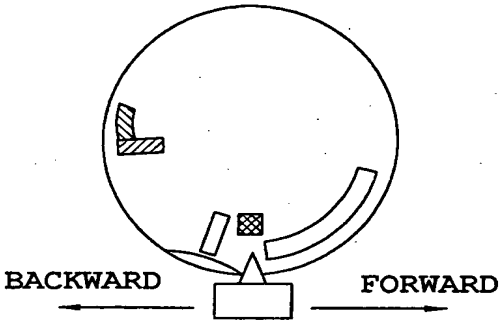


Fig.24

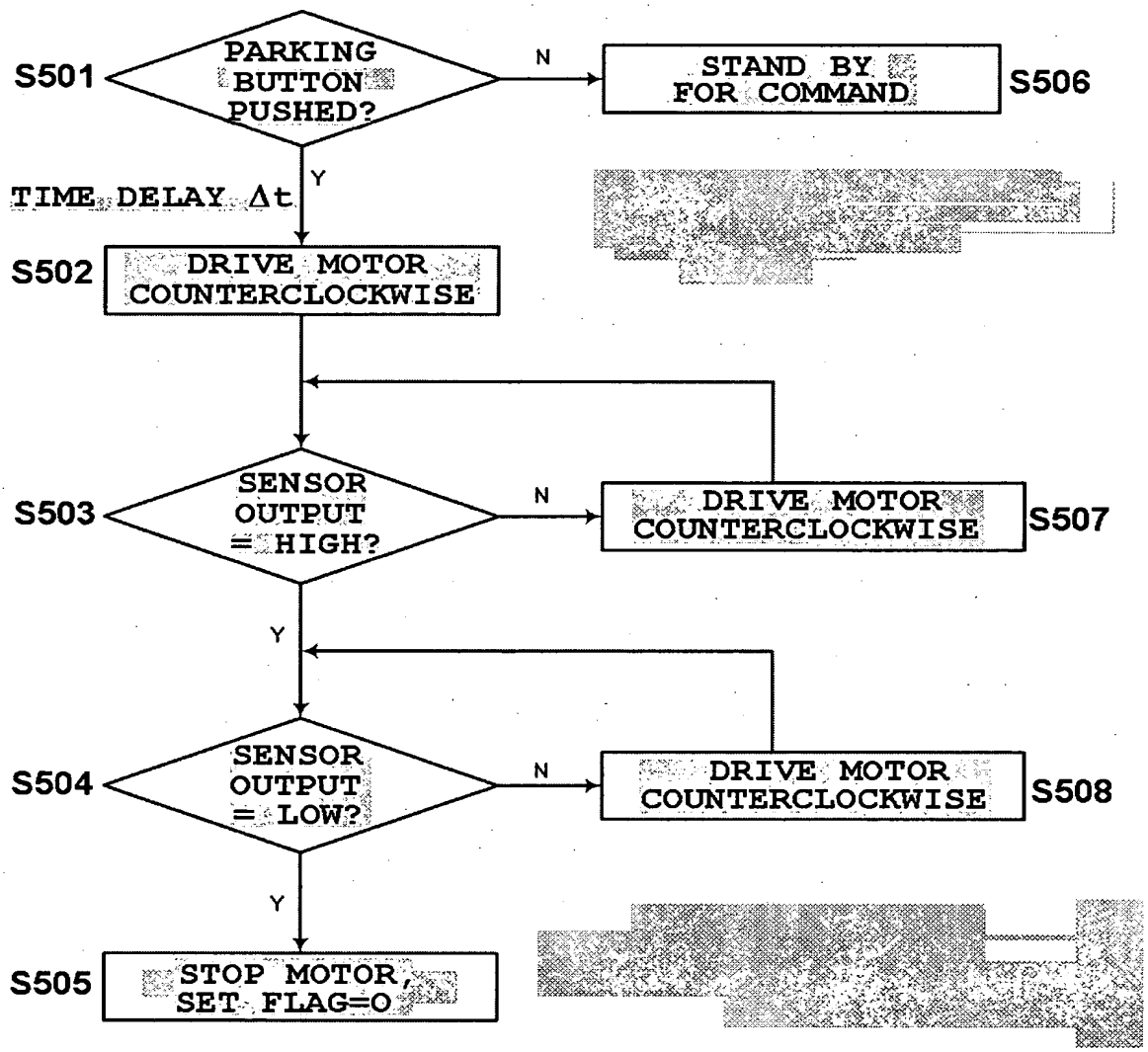

S501
PARKING BUTTON PUSHED?
N
STAND BY FOR COMMAND
S506
Y
TIME DELAY Δt
S502
DRIVE MOTOR COUNTERCLOCKWISE
S503
SENSOR OUTPUT = HIGH?
N
DRIVE MOTOR COUNTERCLOCKWISE
S507
Y
S504
SENSOR OUTPUT = LOW?
N
DRIVE MOTOR COUNTERCLOCKWISE
S508
Y
S505
STOP MOTOR, SET FLAG=0

Fig.25

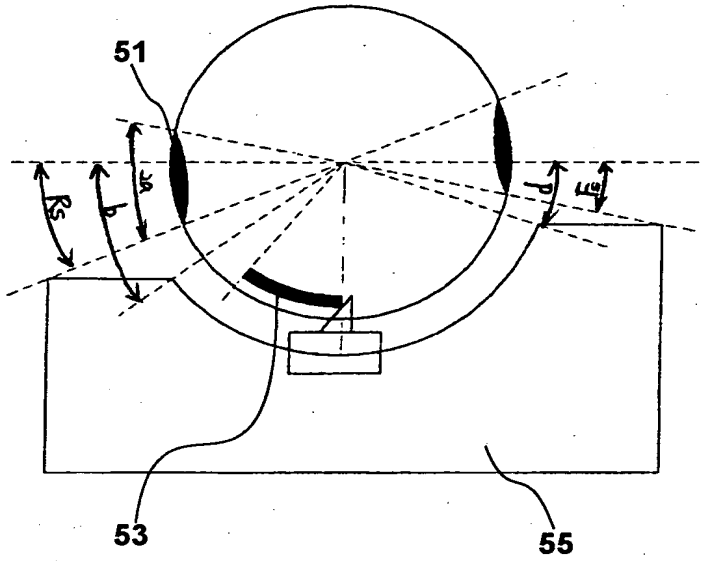


Fig.26

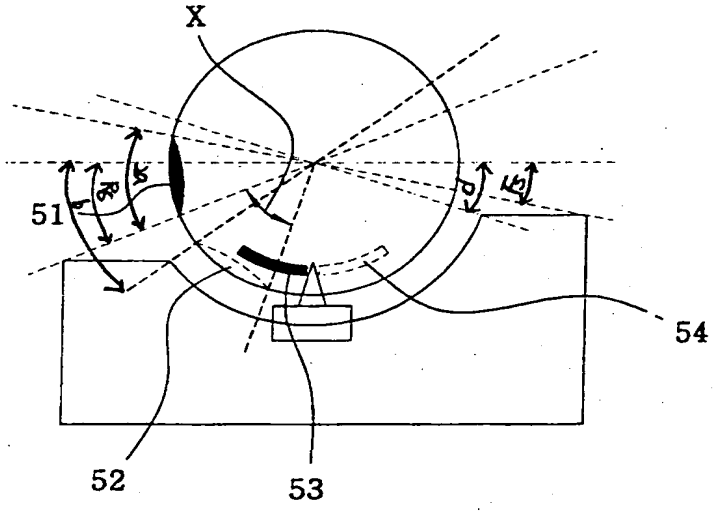


Fig.27

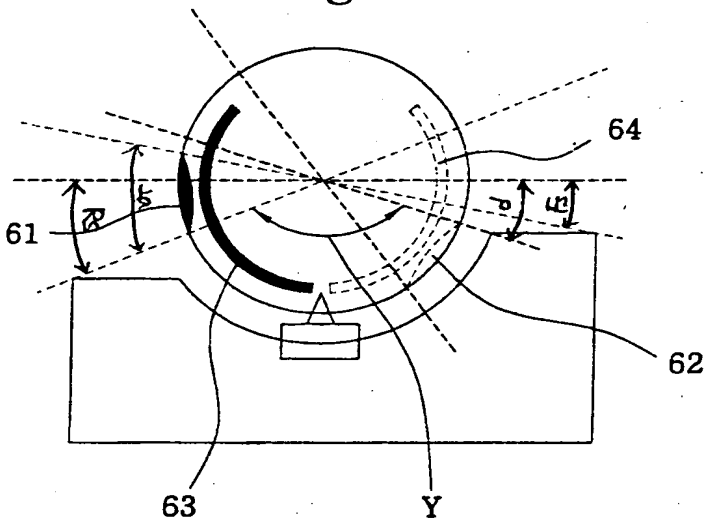


Fig.28a

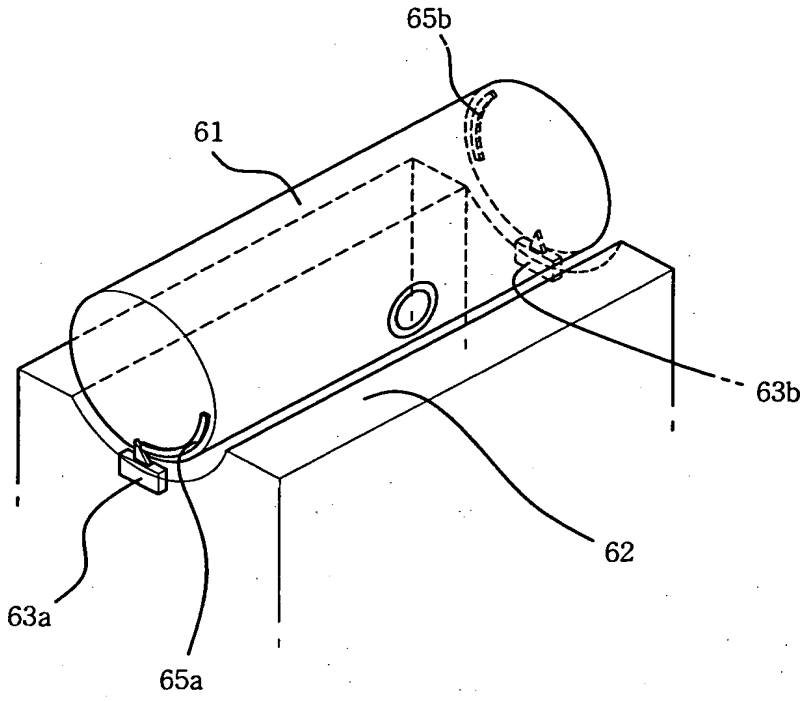


Fig.28b

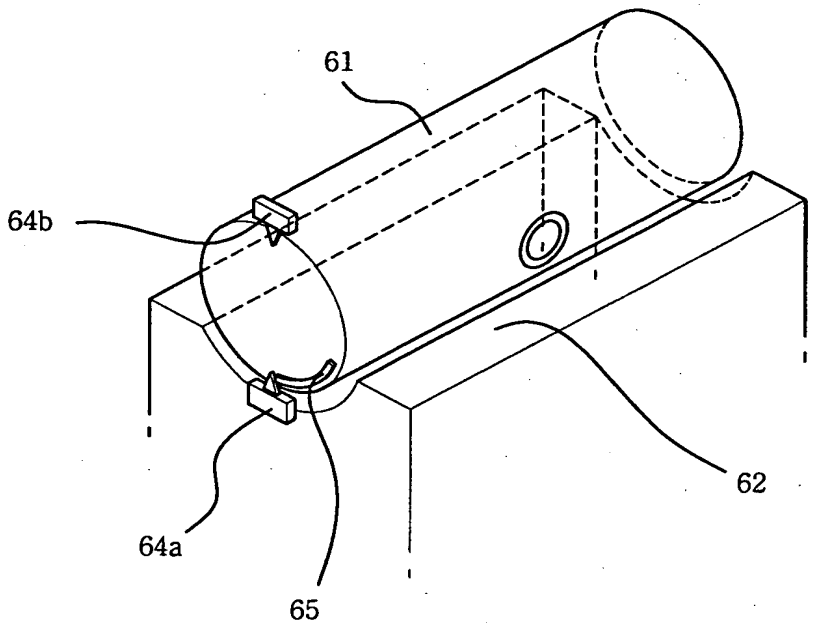


Fig.29

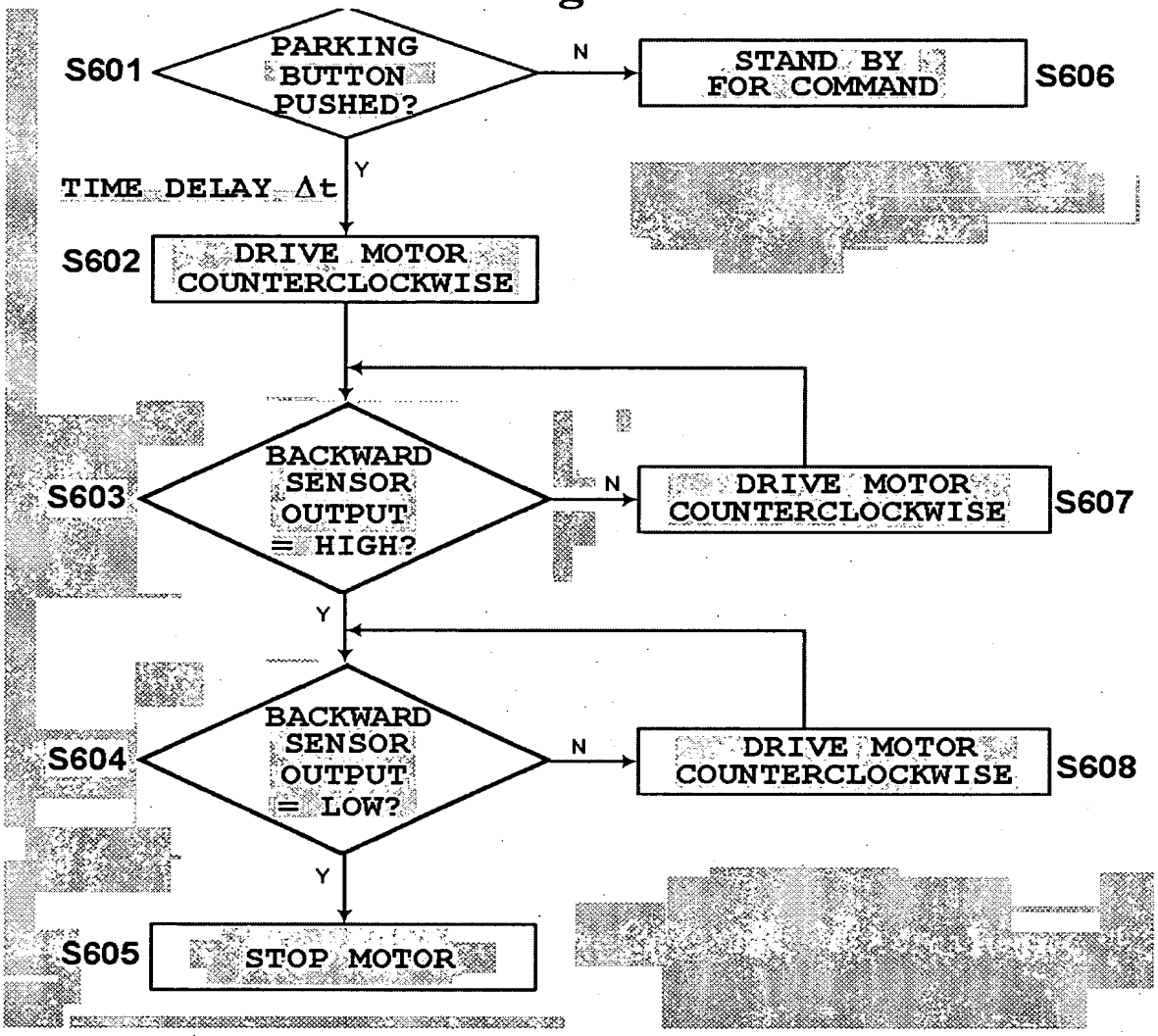
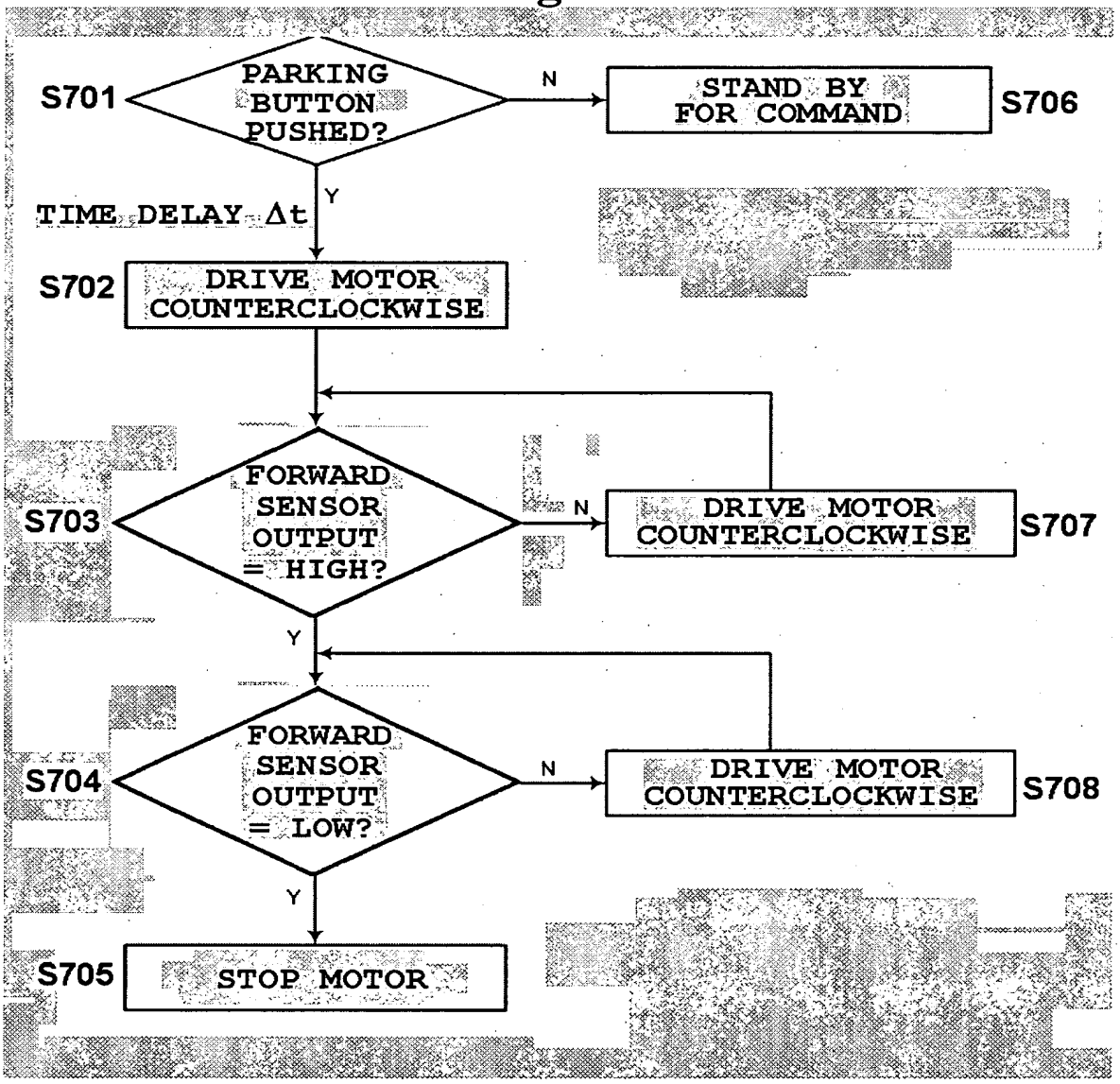

S601
PARKING BUTTON PUSHED?
N
STAND BY FOR COMMAND
S606
Y
TIME DELAY Δt
S602
DRIVE MOTOR COUNTERCLOCKWISE
S603
BACKWARD SENSOR OUTPUT = HIGH?
N
DRIVE MOTOR COUNTERCLOCKWISE
S607
Y
S604
BACKWARD SENSOR OUTPUT = LOW?
N
DRIVE MOTOR COUNTERCLOCKWISE
S608
Y
S605
STOP MOTOR

Fig.30


S701
PARKING BUTTON PUSHED?
N
STAND BY FOR COMMAND
S706
Y
TIME DELAY Δt
S702
DRIVE MOTOR COUNTERCLOCKWISE
S703
FORWARD SENSOR OUTPUT = HIGH?
N
DRIVE MOTOR COUNTERCLOCKWISE
S707
Y
S704
FORWARD SENSOR OUTPUT = LOW?
N
DRIVE MOTOR COUNTERCLOCKWISE
S708
Y
S705
STOP MOTOR